

Abstract Submitted
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The Response of a Colloidal Microparticle near an Electrode to an AC Electric Field PAUL SIDES, JEFFREY FAGAN, DENNIS PRIEVE, Carnegie Mellon University — We monitored the elevation of single colloidal polystyrene microparticles near an electrode in response to an oscillating electric field. The media were HNO_3 , NaHCO_3 , and KOH , and the frequency band was 10 kHz. At low frequencies, large oscillations at the driving frequency with small superimposed Brownian excursions were observed. At high frequencies deterministic oscillations in elevation were negligible compared to Brownian fluctuations, which allowed direct transformation of data into potential energy profiles. The ac field drew the particle closer on average to the electrode in KOH solutions (compared to the no-field average elevation) and the field pushed the particle farther from the electrode in NaHCO_3 . In HNO_3 a reversal of average height was observed at a frequency of 300 Hz at 1.7 kV/m with the particle being drawn closer to the electrode at low frequencies, and being pushed away at higher frequencies. Analysis of the data at a high frequency (10 kHz) revealed a net force that was attractive in KOH , and repulsive in HNO_3 . This net force scaled with $E^2\omega^{-1}$, where E is the amplitude and ω is the frequency.

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